Impact of the Sustainable Food House Area Program on Household Food Security in Bandungrejosari Village, Sukun District, Malang
Approach: propensity Score matching

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Abstract— The program for accelerating food consumption diversification is one of the government's programs to achieve food security in terms of availability. One of the programs already running is the Sustainable Food House Area (Kawasan Rumah Pangan Lestari-KRPL) program. The objectives of the KRPL program are to meet the nutritional and food needs of families, reduce household expenses, increase family income, and improve welfare. The objectives of this study are (1) to analyze the impact of the Sustainable Food House Area program on household food security. The research location is in Bandungrejosari Village, Sukun District, Malang City, East Java Province. The selection of research locations was carried out purposively. The analytical method used is the Propensity Score Matching (PSM) analysis using STATA, to see the impact of the KRPL program on household food security. Based on the results of research on the impact of the sustainable food housing area program on household food security in Bandungrejosari Village, Sukun District, Malang City, it shows that the KRPL program has a positive impact on the level of energy consumption and protein consumption level, namely the level of energy and protein consumption of households in the KRPL program is higher. respectively 331.6 kcal/capita/day and 19.7 gram/capita/day compared to households not under the KRPL program The KRPL program also has a positive impact on the diversity of food consumption patterns of households under the KRPL program as indicated by a higher PPH score of 0.5 compared to households ladder is not a KRPL program.

Keywords—Food Security, Policy, Program, KRPL, Propensity Score Matching, Sustainable Food House Area

I. INTRODUCTION

Food security is the availability of food in the household, so that it can improve the quality of life of the community and also reduce hunger and malnutrition in a household [1]. Food security has various indicators, including by looking at the diversity of food consumed by a community which aims to meet the nutritional needs of the community. The indicator used is the value of the expected food pattern score. In law number 18 of 2012, it is stated that national food security can be achieved if; (1) household and individual needs are met and in conditions of sufficient food availability (2) food security, if the food consumed by households and individuals is free from chemical residues (3) equitable distribution of food,

However, until now the food needs of households and individuals have not been fully met, due to the growth rate of Indonesian food production which is slower than the rate of population growth in Indonesia. This causes the demand for food in Indonesia to be greater than the supply. Therefore, according to the [2] the government needs to optimize the use of both agricultural and food resources efficiently and optimally, by looking at the potential of the land, the level of land fertility and the pattern of food demand. So that food needs can be met.

There are several food security programs launched by the Food Security Service to deal with food security problems, including; Development of Community Food Business / Indonesian Farmer Shops, Strengthening of Food Distribution Institutions, Development of Community Food Barns, Development of Food Independent Areas, Strengthening of Food and Nutrition Awareness Systems, Analysis Map of Food Security and Food Vulnerability, Optimization of Yard Utilization and Supervision of Food Safety and Quality. One of the programs that have been implemented in various regions in Indonesia is the optimization

program for the use of the yard or the sustainable food house area (Kawasan Rumah Pangan Lestari-KRPL). The program has been implemented since 2010, in 2017 this program has been implemented in 4824 villages throughout Indonesia.

The concept of the KRPL program is food diversification by utilizing the home yard to meet the nutritional and food needs of families based on local resources, environmentally friendly, and sustainable in one area, while the purpose of the KRPL program is to meet the nutritional and food needs of families, reduce expenditure costs. household income, increase family income, and improve welfare [3]The basic principles of KRPL are; optimizing the use of environmentally friendly home yards with the aim of achieving food security and food self-sufficiency, diversifying food based on local resources, conserving food resources, and being able to increase income and community welfare ([4]

Bandungrejosari Village, Sukun District, Malang City is a village that implemented the Sustainable Food House Area program earlier than other villages. The KRPL program in Bandungrejosari Village has been started since 2012 until now. The KRPL program in the village has developed, that is, it already has development lands and many processed crops from the KRPL program. However, even though it has grown, the number of KRPL members in this sub-district is still small compared to the number of households in Bandungrejosari Village. From the discussion above, it is necessary to analyze the impact of the KRPL program on household food security, so that it can be seen whether the program has a positive impact on the community.

II. METHODS

The location of the research was determined purposively, with the consideration that in the Bandungrejosari village there are areas that have implemented the KRPL program since 2012 until now. To determine the number of respondents using the Slovin formula and 52 samples were obtained, and the sampling technique used was proportional random sampling, so the samples used in this study were 52 housewives participating in the KRPL program and 52 housewives not participating in the KRPL program.

A. Data analysis method

The impact analysis of the Sustainable Food House Area program was carried out by comparing village communities who were participants in the KRPL program with village communities who were not participants in the KRPL. Analysis of the impact of KRPL using the propensity score matching (PSM) method. According to [5] the propensity score matching (PSM) method is a method of matching between subjects, program participants (treatment variable) or in groups of non-program participants (control variable) or non-participants by using the propensity score value or probability of being exposed or receiving treatment. (or both) using observable characteristics. In this study, the treatment group of program participants were households participating in the KRPL program, while the control group was households that were not participants in the KRPL program.

Propensity Score Matching (PSM) is a popular method for forming comparison groups that have similar characteristics with the group of participants. This method aims to reduce bias when analyzing the impact of a program/activity. This method also uses observational research so that the control group and the treatment group are not random. When the estimation of the impact of the program or activity is biased, it is caused by other factors, when the bias is reduced, the results of the comparison of the control group and the treatment group have similar characteristics. According to [6] the PSM results aim to find the closest comparison group through respondents who participate in the program and respondents who do not participate in the program, where the measurement uses the observed characteristics. The PSM method is considered superior to other methods, because the PSM method can reduce bias in a study. The steps in conducting a propensity score matching (PSM) analysis are

1. Divide the observations into two groups, namely the treatment group and the control group. In this study, the treatment group is a household group participating in the KRPL program, while the control group is a household group that is not a participant in the KRPL program.

2. Estimating the propensity score,namely by selecting the model and variables to be used. The model used is the logit regression model, with the treatment variable, namely the KRPL program, and the independent variable, namely household characteristics (age, education level, total income, number of family members, counseling, nutritional knowledge, energy consumption level and level of education). protein consumption) while the logit equation used is:

$$D = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$$

Information :

D : dummy variable, 1 if KRPL program, 0 not KRPL program

3. Selection of matching algorithm. In this matching, there are four methods, namely nearest neighbor matching, radius matching, kernel matching, and startification matching. In this study, the matching algorithm used is nearest neighbor matching (NNM) by selecting the closest score of covariates in the control group.NNM is a technique that is often used, where each characteristic corresponds to the nearest proportionality value. Giving equal weight to each characteristic with the closest comparison of the proportionality values. In this method, all characteristics of the treatment group have a partner, which is then calculated the difference between the results of the treatment group and the control group. The average treatment effects on the treated (ATT/ATET) value was obtained from the difference in mean. In the NNM method, there may be a problem with the possibility that the closest value obtained has a large difference in the proportionality value between the treatment group and the control group which can affect the ATT value.

4. Identify overlap and common support,This step will issue several observations due to the large difference in scores, either having too high a score or too low a score. Next there is a balance test that is used to see the average PSM control. Average Effect of Treatment for the treated (ATT) is the final outcome excluded, ie the difference in the mean in the treatment groups.

5. Performing matching quality assessment,Rosenbaum and Rubin (1985) suggest assessing matching quality by looking at standardized bias (SB) and t-test. If the pseudo R^2 value is low enough then the covariates X are randomly distributed in the treatment group and the control group.

III. RESULTS AND DISCUSSION

B. Descriptive Statistical Analysis

In this study, three types of variables were used, namely the KRPL Program variable as a treatment variable, where if a household participates in the KRPL program or becomes a participant in the program, the value is 1. Meanwhile, the household that does not participate or is not a participant in the KRPL program has a value of 0. the second is the household characteristic variable consisting of age, education, income, then the number of families, counseling, knowledge of nutrition, energy consumption and protein consumption. And for the third variable, namely the output variable, where for this research the output is the impact of the KRPL program on food security, where the indicator of food security used is diverse food consumption patterns, which can be seen by the PPH score.

Table 1. Descriptive Statistics

Variable	Definition	mean	SD
KRPL Program Dummy	1 if following the KRPL program, 0 if not participating in the KRPL program	0.5	0.5024213
Age	Housewife's age (years)	49	6.909962
Education	Elementary school = 6 years, Middle school = 9 years, High school = 12 years, PT = 16 years	10.52885	2.41338
Income	Total family income (Rp/month)	3761538	957855.4
Number of family	Number of household (person)	3.673077	1.23416
Counseling	1 if you have attended counseling, 0 if you have not attended counseling	0.625	.4864674
Nutrition knowledge	Cooking considerations 1 if based on nutrition, 0 if based on habits/others	0.6057692	0.4910514
Energy consumption	total energy consumption (kcal/capita/day)	2021.885	2980964
Protein Consumption	total protein consumption (grams/capita/day)	59.00962	20.37869

C. Comparison of respondent characteristics

Respondents in this study were housewives who participated in the KRPL program and non-participants of the KRPL program. Where the number of respondents used were 104 housewives consisting of 52 housewives participating in KRPL and 52 housewives not participating in KRPL. Table 2 is a table that explains the differences in the characteristics of households participating in the KRPL program and those not participating in the KRPL program.

From table 2 it can be seen that there are four variables that have significant differences between KRPL participating households and non KRPL participating households. The significant variables are counseling variables, knowledge of maternal nutrition, energy consumption and protein consumption.

Table 2 can explain that households that participated in KRPL were significantly more likely to participate in counseling than households that did not participate in KRPL. It is also significantly known that the nutritional knowledge of housewives who participate in KRPL is higher than that of non-participant housewives. Meanwhile, for energy and protein consumption, household members of KRPL had a significantly higher consumption than the consumption of energy and protein for households of non KRPL participants.

Table 2. Comparison of Respondents Characteristics

Variable	Participants (52)		Non Participant (52)		
	MEAN	SD	MEAN	SD	
Age	49.42308	6.722354	48.57692	7.132764	0.6225
Education	10.67308	2.41338	10.38462	2.458709	0.6076
Income	3853846	917629.4	3669231	996767	0.9826
Number of family	3.769231	1.246413	3.576923	1.226283	0.7931
Counseling	.8269231	.3820047	.4230769	4988675	4.6348***
Mother's nutrition knowledge	.8076923	.3979586	.4038462	4954545	4.5826***
Energy consumption	2202,788	194.0012	1840,981	274.0311	7.7707***
Protein Consumption	69.34615	17.33509	48.67308	17.8981	5.9829***

D. Logistics Regression Analysis

Logistic regression is used to see the possibility of a household to take part in the Sustainable Food House Area program (KRPL) by using independent variables, namely household characteristics (Age, Education, income, Number of families, counseling, knowledge of maternal nutrition, energy consumption, protein consumption) also affect the pattern of food consumption in the household. In table 3.

Table 3. Logistic regression analysis

Variable	Coef	Std. Err	Z-Value	Significance
Age	-0.0023017	0.0256539	-0.09	0.929
Education	0.006744	0.0695083	0.10	0.923
Income	-2.12e-07	1.97e-07	-1.08	0.282
Number of family	0.1230108	0.1486176	0.83	0.408
Counseling	0.3932379	0.3793721	1.04	0.300
Mother's nutrition knowledge	0.8689832	0.3641392	2.39	0.017**
Energy consumption	0.002979	0.0008499	3.51	0.000***
Protein Consumption	0.0187394	0.0092402	2.03	0.043**

Data source: processed, 2018
Note: 0.1 = *, 0.05 = **, 0.001 = ***

Table 3 can explain the effect of the independent variable, namely the characteristics of the household on the household's decision to follow or not participate in the program. From the results of the logistic regression analysis in table 3, it can be seen that there are 3 variables that have a significant effect on participation in the KRPL program, these variables are maternal nutrition knowledge, energy consumption and protein consumption.

Mother's knowledge about nutrition has a positive effect on participation in the KRPL program, the higher the mother's knowledge about nutrition, the greater the opportunity for the household to participate in the KRPL program, due to the mother's curiosity about the latest nutrition information and easy fulfillment of food needs so that housewives have the opportunity to participate in the KRPL program where there are extension activities and food procurement around the house.

Energy consumption and protein consumption also have a positive effect on household participation in the KRPL program. The higher the consumption of energy and protein, the more likely the household will participate in the KRPL program, because of the high need for energy and protein consumption, it is necessary to have food availability in the household so that the household has the opportunity to participate in the KRPL program which makes around the house or household yard. a place for cultivating food crops, so that there is food availability at home

E. **The Impact of the Sustainable Food House Area Program (KRPL) on Food Security**

The Sustainable Food House Area Program (KRPL) is a government program that aims to improve household food security based on local resources. This program has been running since 2012 and has spread to various parts of Indonesia. One area that has implemented the KRPL program since 2012 is the Bandungrejosari village, Sukun sub-district, Malang City. The KRPL program in the Bandungrejosari sub-district, Sukun sub-district, Malang City has been implemented since 2013 and continues to apply until this year. However, in this area there are residents who participate in the KRPL program and do not participate in the KRPL program. This is because there are still residents who do not know the benefits of KRPL for household food security.

a) **The Impact of the Sustainable Food House Area Program on the Level of Household Energy Consumption in Bandungrejosari Village**

The results of the analysis of the impact of the Kawsan Rumah Pangan Lestari (KRPL) program on the level of household energy consumption in the Bandungrejosari village using a propensity score matching analysis are shown in table 4. Prior to the propensity score matching analysis, the difference in household energy consumption levels between those participating in the KRPL program and not participating in the KRPL program had a difference of 361.8 kcal/capita/day. The difference between these differences shows that the energy consumption level of households with the KRPL program is 361.8 kcal/capita/day higher than the energy consumption level of households that do not participate in the KRPL program.

After matching, the difference in the level of energy consumption between households with the KRPL program and households not participating in the KRPL program is 331.8 kcal/capita/day, which means that the energy consumption level of households participating in the KRPL program has a higher consumption level than households. households that do not participate in the KRPL program. According to [7] the level of energy consumption of a household is related to the community's accessibility to food around their home environment, including in their yards. The participation of housewives in the KRPL program also affects nutritional knowledge so that housewives can provide food menus that can meet daily nutritional needs. It is also explained by Laal et.al (2017) that female farmers who participate in program activities have several personal and household characteristics that affect the nutritional status of family members.

Table 4 Impact of the KRPL Program on household energy consumption

Variable	Sample	Treated	Controls	Difference	se	T-stat
energy consumption level	Unmatched	2202.79	1840.98	361.81	46.56	7.77***
	ATT	2202.79	1870.95	331.84	63.15	5.25***

Note: 0.01 = *, 0.05 = **, 0.001 = ***
Source: primary data, processed (2018)

b) **The Impact of the Sustainable Food House Area Program on the Level of Household Protein Consumption in Bandungrejosari Village**

The results of the analysis of the impact of the Kawsan Rumah Pangan Lestari (KRPL) program on the level of household protein consumption in the Bandungrejosari sub-district using a propensity score matching analysis are shown in table 5 before the propensity score matching analysis is carried out, namely matching the differences in the level of household protein consumption between those following the KRPL program. and not participating in the KRPL program has a difference of 48.6 grams/capita/day. The difference between these differences shows that the level of protein consumption of households with the KRPL program is 48.6 grams/capita/day higher than the level of protein consumption of households that do not participate in the KRPL program. This can be caused by differences in the level of protein consumption in the food group. one of which is the consumption of protein in the animal food group.

the consumption of animal food by households participating in the KRPL program was 54.4% more than households non-participating in the KRPL program, which was 23.8%. protein consumption of animal food groups in households with the KRPL program can be fulfilled due to catfish farming in the village nursery, besides that there are also chickens, so that it can make it easier for housewives to get the food ingredients needed. In accordance with research conducted by [8] the existence of fish ponds (Catfish and Tilapia) and poultry including laying hens, native chickens, and goats will be very helpful in terms of increasing consumption of animal food in households.

After matching, the difference in the level of protein consumption between households in the KRPL program and households not participating in the KRPL program is 49.6 grams/capita/day, which means that the level of protein consumption in households participating in the KRPL program has a higher consumption level than households. households that do not participate in the KRPL program. The difference between KRPL program households and non-KRPL program households is due to differences in the diversity of protein consumption patterns in the household. According to [2] rice is still the main source of energy and protein for households. This is in accordance with table 5.

Table 5 Impact of the KRPL program on household protein consumption

Variable	Sample	Treated	Controls	Difference	se	T-stat
protein consumption level	Unmatched	69.35	48.67	20.67	3.46	5.98***
	ATT	69.35	49.61	19.73	4.61	4.28***

Note: 0.01 = *, 0.05 = **, 0.001 = ***
Source: primary data, processed (2018)

c) **Impact of the Sustainable Food House Area Program on household food consumption patterns in Bandungrejosari Village**

The pattern of food consumption in a household can be seen with the approach of the expected food pattern. The results of the analysis of the impact of the Sustainable Food House Area (KRPL) program on household consumption food patterns in the Bandungrejosari village using a propensity score matching analysis are shown in table 6 before the propensity score matching analysis was carried out, namely the matching of differences in household food consumption patterns between those participating in the KRPL program and not participating in the KRPL program, there was a difference in the pph score of 10.8. varied compared to the food consumption patterns of households that did not participate in the KRPL program.

After matching, the difference in food consumption patterns between households with the KRPL program and households not participating in the KRPL program is 0.55, which means that the food consumption patterns of households participating in the KRPL program have a higher consumption level than households that do not participate in the program. According to Ishida (2017), the KRPL program can increase the diversity of consumption patterns and nutrition in the household. The KRPL program also requires its members to produce their own food crops, therefore members are given a minimum of 10 polybags of plants. This is in accordance with [9] statement that households that produce/cultivate food crops have a positive impact on household food security.

Differences in pph scores can also be influenced by the education level of housewives, which is different between households with the KRPL program and households open to the KRPL program, so that their nutritional knowledge is also different. In addition, different total household incomes can result in different food purchasing power. According to [10] Efforts to fulfill food consumption are closely related to the purchasing power of a food ingredient, that families with limited incomes are likely to have less guaranteed diversity of foodstuffs. parental education is one of the important factors in fulfilling family nutrition. The level of education in the family, especially the mother, can be a factor that affects the nutritional status in the family.

Table 6 Impact of the KRPL program on household food consumption patterns (PPH score)

Variable	Sample	Treated	Controls	Difference	se	T-stat
PPH score	Unmatched	**86.75**	**75.87**	**10.88**	**2.20**	**4.94***
	ATT	**86.15**	85.59	0.56	5.04	0.11

Note: 0.01 = *, 0.05 = **, 0.001 = ***
Data source: processed,2018

IV. CONCLUSION

The results of the impact analysis of the KRPL program, which was conducted using the PSM method, showed that the KRPL program had a positive impact on the level of energy consumption and the level of protein consumption. Where the level of energy and protein consumption of KRPL program households is higher than households not participating in the KRPL program. This is indicated by the value of each ATT in the difference column, namely 331.6 kcal/capita/day and 19.73 gram/capita/day, which states that the level of energy and protein consumption of households participating in the KRPL program is higher than households not participating in the KRPL program. For the PPH score, households that are KRPL participants also get a higher ATT score of 0.5 than households that are not KRPL participants.

V. SUGGESTION

Based on the results of research that has been carried out by researchers, there are several suggestions, namely the need for socialization and equitable distribution of information about the Sustainable Food House Area program so that people who have not become participants in the KRPL program know the benefits of the KRPL program. grains which are the main food ingredients and there is a need for additional cultivated plant commodities as well as additional types of fish and poultry in the KRPL program

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